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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Patent Application No. 10/030,464

Applicant: Feussner et al.

Filed: May 22, 2002

TC/AU: 1652

Examiner: Yong D. Pak

Docket No.: 215110 (Client Reference No. PA30743USVZtcl)

Customer No.: 23460

**TRANSMITTAL OF
APPELLANTS' APPEAL BRIEF**

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In accordance with 37 CFR 41.37, appellants hereby submit Appellants' Brief on Appeal.

The items checked below are appropriate:

1. Status of Appellants

This application is on behalf of ☒ other than a small entity or ☐ a small entity.

2. Fee for Filing Brief on Appeal

Pursuant to 37 CFR 41.20(2), the fee for filing the Brief on Appeal is for: ☒ other than a small entity or ☐ a small entity.

Brief Fee Due \$500.00

3. Oral Hearing

☐ Appellants request an oral hearing in accordance with 37 CFR 41.47.
A separate paper requesting oral hearing is attached.

4. Extension of Time

☐ Appellants petition for a one-month extension of time under 37 CFR 1.136, the fee for which is \$ 0.00.
☒ Appellants believe that no extension of time is required. However, this conditional petition is being made to provide for the possibility that

appellants have inadvertently overlooked the need for a petition and fee for extension of time.

Extension fee due with this request: \$0.00

5. Total Fee Due

The total fee due is:

Brief on Appeal Fee	\$500.00
Request for Oral Hearing	\$ 0.00
Extension Fee (if any)	\$ 0.00

Total Fee Due: \$500.00

6. Fee Payment

- ☐ Attached is a check in the sum of \$
- ☒ Charge Account No. 12-1216 the sum of \$500.00. A duplicate of this transmittal is attached.

7. Fee Deficiency.

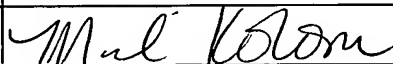
- ☒ If any additional fee is required in connection with this communication, charge Account No. 12-1216. A duplicate copy of this transmittal is attached.

Respectfully submitted,



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Date: July 14, 2006

MAILING/TRANSMISSION CERTIFICATE UNDER 37 CFR 1.8 OR 1.10			
I hereby certify that this document and all accompanying documents are, on the date indicated below, being <input type="checkbox"/> deposited with the U.S. Postal Service using "Express Mail" service in an envelope addressed in the same manner indicated on this document with Express Mail Label Number <input checked="" type="checkbox"/> deposited with the U.S. Postal Service with sufficient postage as first class mail in an envelope addressed in the same manner indicated on this document, or <input type="checkbox"/> facsimile transmitted to the U.S. Patent and Trademark Office at fax number: (571) 273-8300.			
Name (Print/Type)	Melissa E. Kolom		
Signature		Date	July 14, 2006



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APPELLANTS' APPEAL BRIEF

Mail Stop Appeal Brief – Patents
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P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In support of the appeal from the final rejection dated December 19, 2005, and the Advisory Action dated April 7, 2006, Appellants now submit their Brief. The Notice of Appeal was received by the U.S. Patent and Trademark Office on May 18, 2006, thereby making this Appeal Brief due on July 18, 2006.

Real Party In Interest

The patent application that is the subject of this appeal is assigned to Institut für Pflanzenbiochemie-IPB.

Related Appeals and Interferences

There are no appeals or interferences that are related to this appeal.

Status of Claims

Claims 12, 14-16, 18, 20, 22, 24, 26, and 28 are pending. Claims 24, 26, and 28 withdrawn. Thus, claims 12, 14-16, 18, 20, and 22 are the subject of this appeal.

Original claims 1-11 were cancelled, and claims 12-28 were added by way of the “Preliminary Amendment” dated January 8, 2002. Claims 24-28 were withdrawn as being directed to a nonelected invention in response to a restriction requirement by way of the Office Action dated October 6, 2004. Claims 13, 17, 19, 21, 23, 25, and 27 were cancelled by way of the “Response to Office Action” dated March 1, 2006.

Status of Amendments

The claim amendments recited in the “Reply to Office Action” dated March 1, 2006, have been entered for the purposes of this appeal.

Summary of Claimed Subject Matter

The invention defined by the appealed claims pertains to a method of enhancing the specificity of a potato tuber lipoxygenase for position 11 of arachidonic acid. The potato tuber lipoxygenase consists of the amino acid sequence designated SEQ ID NO: 3 (see specification at, e.g., page 3, lines 8-11, and Figure 3). The method comprises changing the amino acid at position 576 of SEQ ID NO: 3 to a phenylalanine (Phe) residue (see specification at, e.g., page 4, lines 14-18, and Figure 3), whereupon the specificity of the potato tuber lipoxygenase for position 11 of arachidonic acid is enhanced (see specification at, e.g., Table 2).

Grounds of Rejection to be Reviewed on Appeal

The only ground of rejection to be reviewed on appeal is whether claims 12, 14-16, 18, 20, and 22 are unpatentable under 35 U.S.C. § 103 over the combined disclosures of Gan et al., *J. Biol. Chem.*, 271: 25412-25418 (1996) (“the Gan reference”), Geerts et al., *Plant Physiol.*, 105: 269-277 (1994) (“the Geerts reference”), and Sloane et al., *Nature*, 354: 149-152 (1991) (“the Sloane reference”).

Argument

The final Office Action and the Advisory Action maintain that the invention defined by claims 12, 14-16, 18, 20, and 22 is allegedly unpatentable under Section 103 over the combined disclosures of the Gan reference, the Geerts reference, and the Sloane reference.

In order to establish a *prima facie* case of obviousness with respect to a claim, at least three criteria must be met: (1) the prior art references must suggest to one of ordinary skill in the art to make the subject matter defined by the claims in issue, (2) the prior art references must provide one of ordinary skill in the art with a reasonable expectation of success in so making the subject matter defined by the claims in issue, and (3) the prior art reference (or references when combined) must teach or suggest all the claim limitations. Both the suggestion and the reasonable expectation of success must be found in the prior art references, not in the disclosure of the patent application in issue. See, e.g., *In re Vaeck*, 947 F.2d 488, 493, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991).

The Gan reference describes the structure of the arachidonic binding site of human 15-lipoxygenase. In particular, the Gan reference discloses that amino acid residues at positions 417 and 418 of human platelet 12 lipoxygenase and human reticulocyte 15 lipoxygenase correspond to amino acid residues at positions 556 and 557, respectively, of soybean lipoxygenase-1 (see page 25412, right column). These residues are said to be important features of the binding site for the methyl end of the fatty acid substrate. Based on a sequence alignment performed by the Patent Office, position 418 of human platelet 12 lipoxygenase and human reticulocyte 15 lipoxygenase corresponds to the amino acid residue at position 576 of a potato tuber 5-lipoxygenase.

The Gan reference further discloses that amino acid residues at positions 402 and 414 of human 15-lipoxygenase are critical for the binding of fatty acid substrates (see Abstract and page 25418, left column, last paragraph). Using the same sequence alignment provided by the Patent Office, amino acid residues 402 and 414 of human lipoxygenase correspond to amino acid residues 560 and 572, respectively, of potato tuber 5-lipoxygenase.

The Sloane reference discloses the identification of the amino acids that confer substrate specificity to human 12- and 15-lipoxygenases. In particular, the Sloane reference discloses that substitution of the amino acids at position 416, 417, and 418 affects the substrate specificity of each enzyme. In this regard, the Sloane reference reports that a methionine residue at position 418 of human lipoxygenases (which corresponds to amino acid residue 576 of potato tuber 5-lipoxygenase) is the primary determinant of substrate positional specificity.

The Geerts reference allegedly discloses a cDNA sequence encoding a potato tuber 5-lipoxygenase having an amino acid sequence identical to SEQ ID NO: 3, as well as a vector and a host cell comprising the cDNA sequence.

The Patent Office concludes that, in order to alter the enzyme's positional specificity for arachidonic acid, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to mutagenize the potato tuber lipoxygenase disclosed in the Geerts reference at amino acid position 576, and that one of ordinary skill in the art could have done so with a reasonable expectation of success and thereby arrived at the invention defined by the appealed claims.

The combination of the Gan, Sloane, and Geerts references, however, does not provide one of ordinary skill in the art with a reasonable expectation of success in making the invention defined by the appealed claims. In this regard, the combination of the Gan and Sloane references discloses multiple residues of human lipoxygenase that are critical to substrate binding. These residues correspond to amino acid residues 560, 572, 575, and 576 of potato tuber lipoxygenase. Thus, to alter the positional specificity of potato tuber 5-lipoxygenase for arachidonic acid, one of ordinary skill in the art would not know to alter position 576 of SEQ ID NO: 3 because at least three other "critical" substrate binding positions are identified in the prior art.

Furthermore, none of the cited references discloses or suggests that replacement of the amino acid at position 576 of SEQ ID NO: 3 with a phenylalanine (PHE) residue would enhance the specificity of a potato tuber 5-lipoxygenase for position 11 of arachidonic acid, as required by the appealed claims. Indeed, out of the 20 possible amino acids, none of the cited references provides any guidance as to which amino acid would enhance the substrate specificity of a potato tuber lipoxygenase.

Thus, in view of the foregoing, one of ordinary skill in the art was faced with a variety of possible mutation sites and no teaching or suggestion as to the identity of a suitable replacement amino acid. Under the circumstances, the combination of the Gan, Sloane, and Geerts references does not render obvious the invention defined by the appealed claims.

Even if a *prima facie* case of obviousness were set out by the Patent Office, the basis for the rejection is rebutted, and the obviousness rejection is overcome, by objective evidence of nonobviousness, which must be considered when determining obviousness. See *Stratoflex*,

Inc. v. Aeroquip Corp., 713 F.2d 1530, 1538, 218 U.S.P.Q. 871, 879 (Fed. Cir. 1983). Such evidence exists here. In particular, the Rule 132 Declaration of Dr. Ivo Feussner, which was submitted with the “Response to Office Action” dated September 20, 2005, demonstrates that the method defined by claims 12, 14-16, 18, 20, and 22 involves a mechanism that shifts potato tuber lipoxygenase specificity from the 5-position to the 11-position of arachidonic acid that is surprisingly different from the mechanism disclosed in the Sloane reference.

Conclusion

For the foregoing reasons, Appellants respectfully request the reversal of the rejection of the subject patent application.

Respectfully submitted,



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Date: July 14, 2006

Claims Appendix

1.-11. (Cancelled)

12. (Currently Amended) A method of enhancing the specificity of a potato tuber lipoxygenase for position 11 of arachidonic acid, wherein the potato tuber lipoxygenase consists of SEQ ID NO: 3, which method comprises changing the amino acid at position 576 of SEQ ID NO: 3 to a Phe residue, whereupon the specificity of the potato tuber lipoxygenase for position 11 of arachidonic acid is enhanced.

13. (Cancelled)

14. (Previously Presented) the method according to claim 12, characterized in that the amino acid change is effected by directed mutagenesis.

15. (Previously Presented) the method according to claim 13, characterized in that the amino acid change is effected by directed mutagenesis.

16. (Previously Presented) An isolated or purified lipoxygenase obtained by the method of claim 12.

17. (Cancelled)

18. (Previously Presented) An isolated or purified nucleic acid encoding the lipoxygenase of claim 16.

19. (Cancelled)

20. (Previously Presented) An isolated or purified vector comprising the nucleic acid of claim 18.

21. (Cancelled)

22. (Previously Presented) An isolated cell comprising the nucleic acid of claim 18 and/or a vector comprising said nucleic acid.

23. (Cancelled)

24. (Withdrawn) A plant or a plant part comprising the cell of claim 22.
25. (Cancelled)
26. (Withdrawn) A method for producing 11-perhydroxy arachidonic acid or the reduced 11-hydroxy derivative thereof comprising incubating arachidonic acid with the lipxygenase of claim 16 under appropriate conditions, whereupon 11-perhydroxy arachidonic acid is obtained, and, optionally, reducing the 11-perhydroxy arachidonic acid, whereupon the reduced 11-hydroxy derivative thereof is obtained.
27. (Cancelled)
28. (Withdrawn) An arachidonic acid derivative containing a hydroxy group at position 11.

Evidence Appendix

Not Applicable

Related Proceedings Appendix

Not Applicable